

Concept of Operations (ConOps)

Summary Description:

The Concept of Operations (ConOps) is a user-oriented document that describes the characteristics for a proposed automated system or an information technology (IT) situation (e.g., Enterprise Email System or Enterprise Data Center Initiative) from the viewpoint of any individual or organization who will use the proposed automated system or situation in their daily work activities or who will operate or interact directly with the automated system or situation. The ConOps is used to communicate overall quantitative and qualitative system or situation characteristics to the Business Owner(s)/Partner(s), Users, System Developer(s), and other organizational elements (e.g., CMS Information Technology Investment Review Board (ITIRB), Executive Steering Committee (ESC), and Office of Information Services (OIS)) to achieve understanding and buy-in. The ConOps is prepared in conjunction with the [Business Case Analysis \(BCA\)](#) to describe the user organization(s), mission(s), and organizational objectives for a proposed system or situation from an integrated systems point of view, whereas the BCA describes the proposed system or situation from an investment point of view.

The ConOps provides an analysis that bridges the gap between the users' operational needs and visions and the System Developer's technical specifications, without becoming bogged down in detailed technical issues that shall be addressed during systems analysis activities. The ConOps also documents a system's characteristics and the users' operational needs in a manner that can be confirmed by the user without requiring any technical knowledge beyond that required to perform normal job functions. Through development of a ConOps, Business Owner(s)/Partner(s) may find that business process improvement together with systems modernization or new functionality development might be necessary to satisfy new business needs, as well as providing flexibility for satisfying anticipated business drivers.

The ConOps documents the users' desires, visions, and expectations without requiring the provision of quantified, testable specifications until later in the system life cycle. For example, the users could express in the ConOps their need for a "highly reliable" system, and their reasons for that need, without having to produce a testable reliability requirement at the same time. In this case, the users' need for "high reliability" might be stated in quantitative terms prior to issuing a Request for Proposal (RFP), or it might be quantified by the System Developer during requirements analysis and documented in the subsequent Requirements Document. The ConOps also provides a mechanism for users and Business Owner(s)/Partner(s) to express thoughts and concerns on possible solution strategies and to record design constraints, the rationale for those constraints, and to indicate the range of acceptable solution strategies.

Status:

Conditionally Mandatory - All new or proposed ["Major" IT investments/projects](#) must prepare a Concept of Operations (ConOps) in conjunction with a [Business Case Analysis \(BCA\)](#) to support the CMS Information Technology Investment Review Board (ITIRB) investment funding decision, while all new or proposed "Non-Major" IT investments/projects are encouraged to produce a ConOps in conjunction with a BCA as

an established best practice. In some cases, multiple ConOps documents may be necessary if the IT investment is comprised of more than one proposed automated system or situation.

Timeframe:

An initial version of the Concept of Operations (ConOps) is initiated and completed during the [Business Case Analysis Phase](#), and may serve as input in conjunction with the [Business Case Analysis \(BCA\)](#) for the [Investment Selection Review \(ISR\)](#) that is performed at the end of the Business Case Analysis Phase. As the proposed automated system or situation evolves, the nature and details of the work to be done will become better understood. Thus, the ConOps document should be placed under configuration control and updated periodically to reflect the evolving situation. For instance, an updated version of the ConOps should be prepared and included as an appendix to the [Implementation Plan](#) that is prepared during the [Development Phase](#) to more accurately describe the automated system that has been built and is ready for implementation. Information provided in the ConOps regarding operational scenarios can also serve as the basis for development of the [Requirements Document](#), [Test Case Specification](#), [User Manual](#), and [Operator Manual](#) that are prepared during various phases of the system life cycle.

Responsible Reviewing Component:

[OIS/PMSG](#) is the CMS component that has the primary decision authority over the need for a Concept of Operations (ConOps), requirements for its creation, and acceptance of the end product in meeting the information needs.

Primary Information Exchange Partners:

The following are the primary stakeholders who have an interest in the content of the Concept of Operations (ConOps):

[Project Owner/Manager](#)

[Business Owner\(s\)/Partner\(s\)](#)

[System Owner/Manager](#)

[Component Lead](#)

[System Developer](#)

[OIS/ISMG](#)

[OIS/ITAPS](#)

[OIS/SSG](#)

[OIS/EDG](#)

[OIS/TMG](#)

[IT Infrastructure Implementation Agent or Contractor](#)

[Executive Steering Committee \(ESC\)](#)

[CMS Information Technology Investment Review Board \(ITIRB\)](#)

Government Responsibilities:

The [Project Owner/Manager](#) is responsible for working with their designated [Component Lead](#) and [OIS/PMSG](#) to determine if a Concept of Operations (ConOps) is required for the IT investment/project. If a ConOps is needed or appropriate, then the Project Owner/Manager is responsible for obtaining and providing all of the information that is required in the ConOps. The ConOps may be developed in-house or by a contractor, and should be written based on input received from the [Business Owner\(s\)/Partner\(s\)](#) and representatives of the user community.

Contractor Responsibilities:

A contractor may be utilized to assist in the preparation of the Concept of Operations (ConOps). Also, the [System Developer](#) will typically use the ConOps as a basis for requirements analysis and system development activities, and to familiarize new team members with the problem domain and the system to which the ConOps applies.

Content:

The overall content of the Concept of Operations (ConOps) describes the existing system (manual or automated) or situation that the Business Owner(s)/Partner(s) and user community want to replace, provides justification for a new or modified system and any restrictions on that system, and describes the proposed system or situation by establishing context for and relationships between the high-level business requirements documented in the Business Case Analysis (BCA). The following represents the basic outline of a standard ConOps.

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Glossary

See [Concept of Operations \(ConOps\) Content \(PDF - 35KB\)](#) for a detailed description of the expected content for each of the major components of the ConOps.

Guidance:

If you are beginning a new IT project or seeking funding for a proposed new IT investment, please contact your designated [Component Lead](#), who will put you in touch with a representative from OIS/PMSG to assist you in determining if a Concept of Operations (ConOps) is required or encouraged for your project.

Review Process:

Business Owner(s)/Partner(s) and user representatives should be involved in reviewing, revising, and approving the Concept of Operations (ConOps) to ensure that their needs and desires have been correctly specified. The information contained in the ConOps is utilized by the Executive Steering Committee (ESC) and the CMS Information Technology Investment Review Board (ITIRB) for the purpose of ensuring that business drivers guide CMS' IT investments and to ensure that there is adequate information and justification to support the advice and recommendations that the ESC and the CMS ITIRB make regarding expenditures of appropriated CMS IT investment funds. The ConOps may also be provided to potential contractors as Government Furnished Information (GFI) to support a Request for Proposal (RFP) for development of the proposed system. The information contained in the ConOps is also utilized by the Office of Information Services (OIS) and its support contractors or agents to prepare for the changes that will be brought about by the new system and to plan for the impacts on the support and maintenance organizations during the development of and transition to the new operational system.

Date Created/Modified:

January 2005

Concept of Operations (ConOps) Content

The following is an outline and description for each of the major components of the Concept of Operations (ConOps) document:

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1. Introduction

[Provide identifying information for the existing and proposed systems or situations for which the ConOps applies (e.g., the full names and acronyms for the development project, the existing system or situation, and the proposed system or situation, as applicable). Summarize the purpose of the document, the scope of activities that resulted in its development, its relationship to other relevant documents (e.g., the corresponding Business Case Analysis (BCA)), the intended audience for the document, and expected evolution of the document. Also describe any security or privacy considerations associated with use of the ConOps.]

2. Referenced Documents

[Provide identifying information for all documents referenced within the ConOps document (e.g., legislation, feasibility studies, documents concerning related projects, relevant technical documentation, etc.)]

3. Current System or Situation

[Describe the system or situation (either automated or manual) as it currently exists. If there is no current system on which to base changes, then describe the situation that motivates development of the proposed system.]

3.1. Background, Objectives, and Scope

[Provide an overview of the current system or situation, including as applicable, background, mission, goals, objectives, scope, business drivers, and motivation for the current system.]

3.2. Operational Policies and Constraints

[Describe the operational policies and constraints affecting the operations of the current system. Operational policies are predetermined management decisions regarding the operations of the current system, normally in the form of general statements or understandings that guide or limit decision-making activities, but do allow for some discretion. Operational constraints are limitations placed on the operations of the current system (e.g., available hours of system operation, available number of personnel to operate the system, computer hardware and operational facilities constraints).]

3.3. Description of Current System or Situation

[Provide a description of the current system or situation that is simple and clear enough that all intended readers of the document can fully understand it. Provide a

graphical overview of the current system or situation in the form of a context diagram, a top-level object diagram, or some other type of diagram that depicts the system and its environment. The description should include the following as appropriate:

- a) The operational environment and its characteristics (e.g., facilities, equipment, computing hardware, software, communications links, personnel, and operational procedures used to operate the existing system);
- b) Major system components and the interconnection among those components;
- c) Interfaces to external systems or procedures;
- d) Capabilities, functions, and features of the current system, including types of transactions processed;
- e) Charts and accompanying descriptions depicting inputs, outputs, data flows, control flows, and manual and automated processes sufficient to understand the current system or situation from the user's point of view (e.g., business process models, data flow diagrams);
- f) Cost of system operations;
- g) Operational risk factors;
- h) Performance characteristics, such as speed, throughput, volume, frequency;
- i) Quality attributes, such as: availability, correctness, efficiency, expandability, flexibility, interoperability, maintainability, portability, reliability, reusability, supportability, survivability, and usability; and
- j) Provisions for safety, security, privacy, integrity, and continuity of operations in emergencies that exert influence on the operation or operational environment of the current system.]

3.4. Current Modes of Operation

[Describe the various modes of operation for the current system or situation (e.g., normal, degraded, exception handling, maintenance, training, backup, emergency, alternate-site, active, and idle modes). All of the modes that apply to all classes of users should be included, and especially the modes that involve different sites and equipment that have significant impacts on the operational aspects of the system or situation. System processes, procedures, and capabilities or functions should be related to each mode, as appropriate, perhaps using a cross-reference matrix.]

3.5. Current Users and Stakeholders

[A user class is distinguished by the ways in which users interact with the present system or situation. Factors that distinguish a user class include common responsibilities, skill levels, work activities, and modes of interaction with the system. In this context, a user is anyone who interacts with the existing system, including operational users, data entry personnel, system operators, operational support personnel, system maintainers, and trainers. Subordinate sections might provide existing organizational structure(s) of the various user groups and user classes that are involved with the current system or situation; profiles of user classes; interactions among user classes; and identification of other involved personnel who do not directly interact with the system, but who have an influence on it or are influenced by the existing system or situation.)]

3.6. Current Support Environment

[Describe the support concepts and support environment for the current system or situation, including the support organization; facilities; equipment; support software; repair or replacement criteria; maintenance levels and cycles; and storage, distribution, and supply methods.]

4. Justification and Description of Changes

[Briefly describe the shortcomings of the current system or situation that motivate development of a new system or modification of an existing system. If there is no current system on which to base changes, then so indicate and provide justification for the features of the new system.]

4.1. Justification of Changes

[Briefly summarize new or modified aspects of the user needs, missions, objectives, environments, interfaces, personnel, or other factors that require a new or modified system. Summarize the deficiencies or limitations of the current system or situation that make it unable to respond to new or changed factors. Provide justification for a new or modified system (e.g., legislative drivers, new opportunities, improvements, new functional capabilities).]

4.2. Description of Desired Changes

[Summarize the new or modified capabilities, functions, processes, interfaces, and other changes needed to respond to the factors identified in 4.1. Changes should be based on the current system described in section 3 of the document. If there is no existing system on which to base changes, then summarize the capabilities to be provided by a new system. This description should include the following, as appropriate:

- a) Capability changes
- b) System processing changes
- c) Interface changes
- d) Personnel changes
- e) Environment changes
- f) Operational changes
- g) Support changes
- h) Other changes]

4.3. Priorities Among Changes

[Identify priorities among the desired changes and new features. Each change should be classified as essential, desirable, or optional and a reason provided for the classification.]

4.4. Changes Considered But Not Included

[Identify desired changes and new features considered but not included in section 4.2, and the rationale for not including them.]

5. Proposed System or Situation

[Describe the concepts for the proposed system or situation that results from the desired changes specified in section 4 above. The description should be at a high-level, indicating the operational features that are to be provided without specifying design details. The

description should be of sufficient detail to fully explain how the proposed system is envisioned to operate in fulfilling users' needs and the business requirements. The ConOps may contain some examples of typical design strategies, for the purpose of clarifying operational details of the proposed system, but should not contain design specifications.]

5.1. Background, Objectives, and Scope

[Provide an overview of the proposed system or situation, including as applicable, background, mission, goals, objectives, scope, business drivers, and motivation for the proposed system.]

5.2. Operational Policies and Constraints

[Describe the operational policies and constraints affecting the operations of the proposed system. Operational policies are predetermined management decisions regarding the operations of the proposed system, normally in the form of general statements or understandings that guide or limit decision-making activities, but do allow for some discretion. Operational constraints are limitations placed on the operations of the proposed system (e.g., available hours of system operation, available number of personnel to operate the system, computer hardware and operational facilities constraints).]

5.3. Description of the Proposed System or Situation

[Provide a description of the proposed system or situation that is simple and clear enough that all intended readers of the document can fully understand it. Provide a graphical overview of the proposed system or situation in the form of a context diagram, a top-level object diagram, or some other type of diagram that depicts the system and its environment. The description should include the following as appropriate:

- a) The operational environment and its characteristics (e.g., facilities, equipment, computing hardware, software, communications links, personnel, and operational procedures used to operate the proposed system);
- b) Major system components and the interconnection among those components;
- c) Interfaces to external systems or procedures;
- d) Capabilities, functions, and features of the current system, including types of transactions processed;
- e) Charts and accompanying descriptions depicting inputs, outputs, data flows, control flows, and manual and automated processes sufficient to understand the current system or situation from the user's point of view (e.g., business process models, data flow diagrams);
- f) Cost of system operations;
- g) Operational risk factors;
- h) Performance characteristics, such as speed, throughput, volume, frequency;
- i) Quality attributes, such as: availability, correctness, efficiency, expandability, flexibility, interoperability, maintainability, portability, reliability, reusability, supportability, survivability, and usability; and
- j) Provisions for safety, security, privacy, integrity, and continuity of operations in emergencies that exert influence on the operation or operational environment of the proposed system.]

5.4. Proposed Modes of Operation

[Describe the various modes of operation for the proposed system or situation (e.g., normal, degraded, exception handling, maintenance, training, backup, emergency, alternate-site, active, and idle modes). All of the modes that apply to all classes of users should be included, and especially the modes that involve different sites and equipment that have significant impacts on the operational aspects of the system or situation. System processes, procedures, and capabilities or functions should be related to each mode, as appropriate, perhaps using a cross-reference matrix.]

5.5. Anticipated Users and Stakeholders

[A user class is distinguished by the ways in which users interact with the proposed system or situation. Factors that distinguish a user class include common responsibilities, skill levels, work activities, and modes of interaction with the system. In this context, a user is anyone who interacts with the proposed system, including operational users, data entry personnel, system operators, operational support personnel, system maintainers, and trainers. Subordinate sections might provide existing organizational structure(s) of the various user groups and user classes that are involved with the proposed system or situation; profiles of user classes; interactions among user classes; and identification of other involved personnel who do not directly interact with the system, but who have an influence on it or are influenced by the proposed system or situation.)]

5.6. Proposed Support Environment

[Describe the support concepts and support environment for the proposed system or situation, including the support organization; facilities; equipment; support software; repair or replacement criteria; maintenance levels and cycles; and storage, distribution, and supply methods.]

6. Operational Scenarios

[Provide step-by-step descriptions of how the proposed system should operate and interact with its users and its external interfaces under a given set of circumstances. The scenarios should be described in a manner that will allow readers to walk through them and gain an understanding of how all the various parts of the proposed system function and interact. The scenarios tie together all parts of the system, the users, and other entities by describing how they interact, and may also be used to describe what the system should not do. Operational scenarios should be described for all operational modes and all classes of users identified for the proposed system. Each scenario should include events, actions, stimuli, information, and interactions as appropriate to provide a comprehensive understanding of the operational aspects of the proposed system. The scenarios can be presented in several different ways: 1) for each major processing function of the proposed system, or 2) thread-based, where each scenario follows one type of transaction type through the proposed system, or 3) following the information flow through the system for each user capability, following the control flows, or focusing on the objects and events in the system. The number of scenarios and level of detail specified will be proportional to the perceived risk and the criticality of the project. The scenarios developed for the ConOps can serve as the basis for the subsequent Requirements Document, Test Case Specification, and Users Manual.]

7. Summary of Impacts

[Describe the anticipated operational and organizational impacts of the proposed system on the users, system developers, and the support and maintenance organizations. Also describe the temporary impacts on the users, system developers, and the support and maintenance organizations during the period of time when the new system is being developed, installed, or training is being provided. This information will allow all affected organizations to prepare for the changes that will be brought about by the new system and to plan for the impacts during development and transition to the new system.]

7.1. Operational Impacts

[Describe the operational impacts of the proposed system on the users, system developers, and the support and maintenance organizations. The impacts to consider include the following:

- Interfaces with primary or alternate computer operating centers;
- Changes in procedures;
- Use of new data sources;
- Changes in quantity, type, and timing of data to be input into the system;
- Changes in data retention requirements;
- New modes of operation based on emergency, disaster, or accident conditions;
- New methods for providing input data if the required data are not readily available;
- Changes in operational budget; and
- Changes in operational risks.]

7.2. Organizational Impacts

[Describe the anticipated organizational impacts of the proposed system on the user, development, and support or maintenance organizations during operation of the proposed system. The impacts to consider include the following:

- Modification of responsibilities;
- Addition or elimination of job positions;
- Training or retraining users;
- Changes in numbers, skill levels, position identifiers, or locations of personnel; and
- Numbers and skill levels of personnel needed for contingency operation at one or more alternate sites following an emergency, disaster, or accident.]

7.3. Impacts During Development

[Describe the anticipated impacts on the user, development, and support or maintenance organizations during the development project for the proposed system. The impacts to consider include the following:

- Involvement in studies, meetings, and discussions prior to award of the contract;
- User and support involvement in reviews and demonstrations, evaluation of initial operating capabilities, and evolving versions of the system, development or modification of databases, and required training;
- Parallel operation of the new and existing systems; and
- Operational impacts during system testing of the proposed system.]

8. Analysis of the Proposed System

[Provide an analysis of the benefits, limitations, advantages, disadvantages, and alternatives and trade-offs considered for the proposed system.]

8.1. Summary of Improvements

[Provide a qualitative (and to the extent possible, quantitative) summary of the benefits to be provided by the proposed system. The summary should include benefits realized from new capabilities, enhanced capabilities, deleted capabilities, and improved performance. The benefits should be related to deficiencies identified in section 4.1.]

8.2. Disadvantages and Limitations

[Provide a qualitative (and to the extent possible, quantitative) summary of the disadvantages and/or limitations of the proposed system. Disadvantages might include the need to retrain personnel or change to a new style of user interface. Limitations might include features desired by users but not included or greater-than-desired response time due to hardware constraints.]

8.3. Alternatives and Trade-Offs Considered

[Describe major alternatives considered, the trade-offs among them, and rationale for the decisions reached. In the context of the ConOps, alternatives are operational alternatives, not design alternatives, except to the extent that design alternatives may be limited by the operational capabilities desired in the new system.]

Appendices

[Utilize appendices to facilitate ease of use and maintenance of the ConOps document. Each appendix should be referenced in the main body of the document where that information would normally have been provided.]

Glossary

[Provide clear and concise definitions for terms used in the ConOps that may be unfamiliar to readers of the document.]